

THAT WHICH IS CLAIMED:

1. A content addressable memory (CAM) device, comprising:
a search word input;
a CAM core comprising a plurality of CAM cells; and
5 a virtual partitioning circuit that selectively enables a partition in the CAM core for search of a portion of a search word at the search word input responsive to the search word, and that provides a mapping of the search word to a comparand input to the CAM core, the mapping defining a virtual subpartition.
- 10 2. A CAM device according to Claim 1, wherein the virtual partitioning circuit receives a first portion of the search word and responsively constrains search for a second portion of the search word to the partition of the CAM core, and wherein the virtual partitioning circuit generates a comparand input corresponding to a virtual subpartition of the partition from the first portion of the search word.
- 15 3. A CAM device according to Claim 2, wherein the virtual partitioning circuit masks selected cells of the CAM core responsive to the first portion of the search word.
- 20 4. A CAM device according to Claim 3, wherein the virtual partitioning circuit comprises a column mask control circuit that masks selected columns of the CAM core responsive to the first portion of the search word.
- 25 5. A CAM device according to Claim 2, wherein the virtual partitioning circuit enables search of selected rows of CAM cells of the CAM core responsive to the first portion of the search word.
- 30 6. A CAM device according to Claim 2, wherein the virtual partitioning circuit comprises:
a row selection circuit that selects from a plurality of sets of rows of CAM cells in the CAM core responsive to the first portion of the search word; and
a column mask circuit that masks columns of the CAM core responsive to first portion of the search word.

7. A CAM device according to Claim 6, wherein the column mask circuit is operative to select among sets of columns of the CAM core for search responsive to the first portion of the search word, and further comprising:

5 respective match line circuits that generate corresponding sets of match line outputs for the sets of columns for respective ones of the rows of CAM cells of the CAM core; and

 an encoder circuit that receives the match line outputs and generates a search result from selected ones of the match line outputs responsive to the first portion of the search word.

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8. A CAM device according to Claim 6, wherein the column mask circuit is operative to select among sets of columns of the CAM core for search responsive to the first portion of the search word, and further comprising:

15 respective match line circuits that generate single match line outputs for respective rows of CAM cells of the CAM core; and

 an encoder circuit that receives the single match line outputs and generates a search result from the single match line outputs.

9. A CAM device according to Claim 8, wherein the match line circuits
20 comprise respective pipelined match line circuits for the respective rows of CAM cells of the CAM core that propagate match indication signals across the sets of columns of the CAM core in a pipelined manner.

10. A CAM device according to Claim 9, wherein the virtual partitioning
25 circuit comprises:

 a mapper circuit that receives first portions of search words at the search word input and sequentially selects sets of rows, masks sets of columns, and applies virtual subpartition comparand inputs to the comparand input of the CAM core responsive to the first portions of the search words; and

30 an input buffer circuit that receives second portions of the search words and sequentially applies the second portions of the search words to the comparand input of the CAM core,

 wherein operations of the mapper circuit, the input buffer circuit, the pipelined match line circuits and the encoder circuit are coordinated to sequentially produce

respective search results for respective ones of the search words from the encoder circuit.

11. A CAM device according to Claim 2, wherein the first and second
5 portions of the search word are mutually exclusive sets of bits.

12. A CAM device according to Claim 1, wherein the virtual partitioning circuit is responsive to a configuration input to define the partitions and subpartitions of the CAM core.

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13. A CAM device according to Claim 12, wherein the virtual partitioning circuit selectively enables partitions in the CAM core for search of portions of search words at the search word input responsive to the search word and provides a mapping of the search words to comparand inputs to the CAM core, and wherein the virtual
15 partitioning circuit is further configurable to vary the width of the portions of the search words that are searched in the CAM core.

14. A CAM device according to Claim 1, wherein the virtual partitioning circuit comprises a lookup table.

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15. A CAM device according to Claim 14, wherein the lookup table is implemented in at least one of a CAM and a RAM.

16. A content addressable memory (CAM) device, comprising:
25 a search word input configured to receive a search word;
a CAM core;
a random access memory (RAM) that accesses a memory location therein responsive to a first portion of the search word and that applies a control input to the CAM core to constrain search for a second portion of the search word to a partition of
30 the CAM core responsive to the accessed memory location.

17. A CAM device according to Claim 16, further comprising a content addressable memory that receives the first portion of the search word and

responsively generates an address therefrom, and wherein the RAM receives the address and responsively accesses the memory location.

18. A content addressable memory (CAM) device, comprising:
5 a search word input;
a CAM core comprising a plurality of CAM cells;
means for selectively enabling a partition in the CAM core for search of a portion of a search word at the search word input responsive to the search word;
means for mapping the search word to virtual subpartition identifier and for
10 providing the virtual subpartition identifier as a comparand input to the CAM core.

19. A CAM device according to Claim 18, wherein the means for selectively enabling a partition of the CAM core for search comprises means for receiving a first portion of the search word and for responsively constraining search
15 for a second portion of the search word to the partition of the CAM core, and wherein the means for mapping the search word to virtual subpartitioning identifier comprises means for generating the virtual subpartition identifier from the first portion of the search word.

20. A method of operating a content addressable memory (CAM) device, the method comprising:
receiving a search word;
selectively enabling a partition in a CAM core for search of a portion of the search word at the search word input responsive to the search word;
25 mapping the search word to a virtual subpartition identifier; and
searching the partition for the portion of the search word in conjunction with searching the CAM core for the virtual subpartition identifier to thereby produce a search result for the search word.

21. A method according to Claim 20:
wherein selectively enabling a partition in a CAM core for search of a portion of the search word at the search word input responsive to the search word comprises selectively enabling the partition for search responsive to a first portion of the search word;

wherein mapping the search word to a virtual subpartition identifier comprises mapping the first portion of the search word to the virtual subpartition identifier; and

wherein searching the enabled partition for the portion of the search word in conjunction with searching the CAM core for the virtual subpartition identifier to
5 thereby produce a search result for the search word comprises searching the enabled partition for a second portion of the search word in conjunction with searching the CAM core for the virtual subpartition identifier to thereby produce the search result for the search word.

10 22. A method according to Claim 21, wherein selectively enabling the partition for search responsive to a first portion of the search word comprises masking selected cells of the CAM core responsive to the first portion of the search word.

23. A method according to Claim 21, wherein selectively enabling the
15 partition for search responsive to a first portion of the search word comprises enabling search of selected rows of the CAM core responsive to the first portion of the search word.

24. A method according to Claim 21, wherein selectively enabling the
20 partition for search responsive to a first portion of the search word comprises:
selecting from a plurality of sets of rows of CAM cells in the CAM core responsive to the first portion of the search word; and
masking columns of the CAM core responsive to first portion of the search word.

25 25. A method according to Claim 24, wherein masking columns of the CAM core responsive to first portion of the search word comprises selecting among sets of columns of the CAM core for search responsive to the first portion of the search word, and further comprising:
30 generating corresponding sets of match line outputs for the sets of columns for respective ones of the rows of CAM cells of the CAM core; and
generating a search result from selected ones of the match line outputs responsive to the first portion of the search word.

26. A method according to Claim 24, wherein masking columns of the CAM core responsive to first portion of the search word comprises selecting among sets of columns of the CAM core for search responsive to the first portion of the search word, and further comprising:

- 5 generating single match line outputs for respective rows of CAM cells of the CAM core; and
 generating a search result from the single match line outputs.

27. A method according to Claim 26, further comprising propagating
10 match indication signals across the sets of columns of the CAM core in a pipelined manner.

28. A method according to Claim 21, wherein the first and second portions of the search word are mutually exclusive sets of bits.

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29. A method of operating a content addressable memory (CAM) device, the method comprising:

- receiving a search word;
 accessing a memory location in a random access memory (RAM) responsive
20 to a first portion of the search word; and
 constraining search for a second portion of the search word to a partition of the CAM core responsive to the accessed memory location.

30. A method according to Claim 29, further comprising receiving the first
25 portion of the search word at a comparand input of a CAM and responsively generating an address therefrom, and wherein accessing a memory location comprises accessing the memory location responsive to the generated address.